



## Evaluating ecosystem respiration in a Japanese temperate cypress forest

S. Ohkubo (1), Y. Kosugi (1), S. Takanashi (2), T. Mitani (3), M. Tani (1)

(1) Graduate School of Agriculture, Kyoto University, Kyoto 606-8502, Japan, (2) Forestry and Forest Products Research Institute, Tsukuba, Ibaraki 305-8687, Japan, (3) Forestry Agency Japan, Tokyo 100-8952, Japan.

(shinjiro@kais.kyoto-u.ac.jp / Phone: +81-75-753-6149)

Underestimation of nocturnal CO<sub>2</sub> respiration using the eddy covariance method under calm conditions remains an unsolved problem at many flux observation sites in forests. To evaluate nocturnal CO<sub>2</sub> exchange in a Japanese cypress forest, we observed soil, and trunk and foliar respiration in addition to CO<sub>2</sub> flux above the canopy ( $F_c$ ), changes in CO<sub>2</sub> storage in the canopy ( $S_t$ ) and for 2 years (2003–2004). We scaled these chamber data to the soil, trunk, and foliar respiration per unit of ground area ( $F_s$ ,  $F_t$ ,  $F_f$ , respectively) and used the relationships of  $F_s$ ,  $F_t$ , and  $F_f$  with air or soil temperature for comparison with canopy-scale CO<sub>2</sub> exchange measurements (=  $F_c + S_t$ ).  $F_s$  was smaller than in the dry period than in other periods.  $F_t$  and  $F_f$  were greater during the growing season (1 May–15 July) than during the non-growing season. The annual average  $F_s$ ,  $F_t$ , and  $F_f$  were 714 g C m<sup>-2</sup> year<sup>-1</sup>, 170 g C m<sup>-2</sup> year<sup>-1</sup>, and 575 g C m<sup>-2</sup> year<sup>-1</sup>, respectively. At small friction velocity ( $u_*$ ),  $F_s + F_t + F_f$  estimated using the chamber method was larger than nocturnal  $F_c + S_t$ , whereas the two values were almost the same at large  $u_*$ . When we replaced all nocturnal  $F_c + S_t$  data with  $F_s + F_t + F_f$  estimated using the chamber method, NEE changed from -713 to -506 and from -883 to -682 g C m<sup>-2</sup> year<sup>-1</sup> for 2003 and 2004, respectively.